

EFFECT OF PRESSURE ON ELECTROSTATIC PROCESSES ON MARS

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Paschen's Law as illustrated by Paschen curves for various gases (Figure 1) shows that the minimum breakdown voltage for gases for breakdown distances of interest i.e. 1-1000 mm will be at or near the surface pressure on Mars. This means that the physics of many electrostatic processes will be markedly different on Mars than on Earth.

The primary effect will be that voltage potentials above 100 volts will most certainly be subject to breakdown in the martian atmosphere. The curves of Figure 1 are the minimums produced under ideal conditions with smooth, clean electrodes. Sharp electrodes, dusty atmosphere conditions or other anomalies will modify the breakdown voltage, usually causing lower breakdown voltages.

Paschen's curves for most common pure gases have been experimentally determined. A very small amount of mixing of different gases radically changes the curve as shown in the curve for neon plus 0.1% argon compared to either neon or argon. Paschen's curve for the exact composition of gases for Mars has not been determined and thus the breakdown voltages are not known.

A second important effect is that the breakdown for most martian cases will be a glow discharge rather than a spark discharge. It would seem that simple measurements of breakdown manner and voltage should be included on a Mars lander vehicle

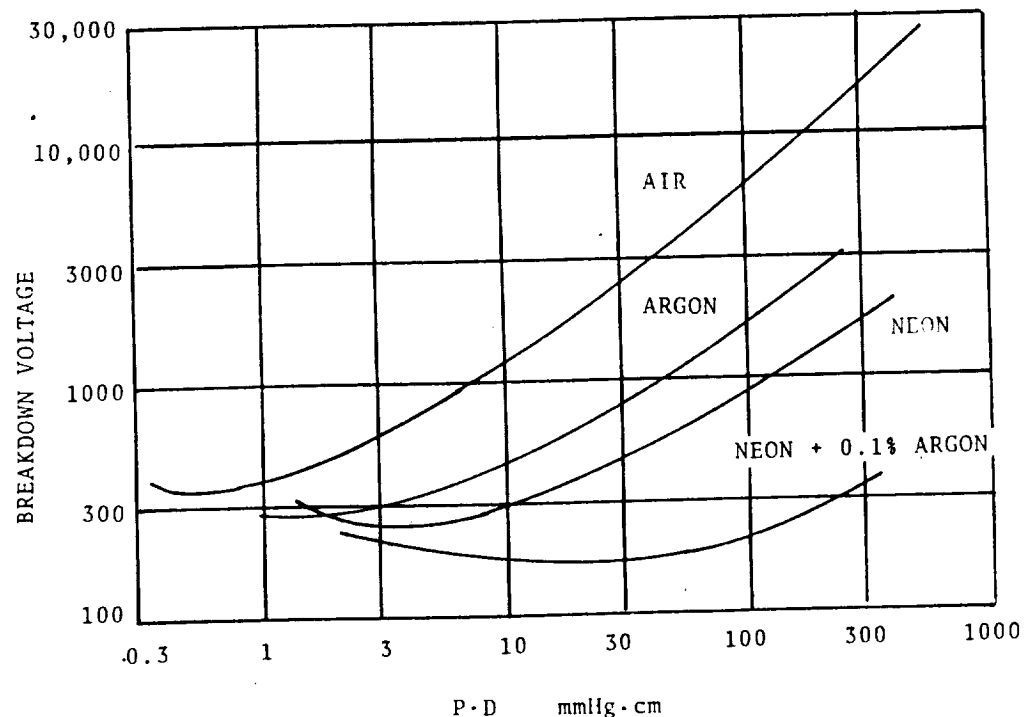


FIGURE 1 PASCHEN'S CURVES